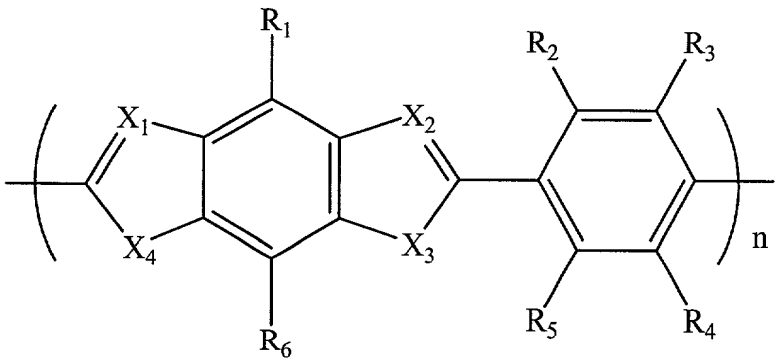
WHAT IS CLAIMED IS:

1. A thermally stable, non-woven, fibrous paper, comprising:

- at least one polymer represented by structural formula I:



(I)

- wherein R_{1-6} are the same or different and comprise H, a hydroxyl group, a straight or branched alkyl, cycloalkyl, polycycloalkyl, heterocycloalkyl, alkaryl, alkoxy, aryl, aralkyl, alkenyl, or alkynyl group containing approximately 1 to approximately 50 carbon atom(s), carbonyls, esters, carbonates, amides, ketenes, epoxides, a silyl or siloxyl group containing approximately 1 to approximately 50 silicon atom(s), and combinations thereof;

- wherein X_{1-4} are the same or different and comprise N, O, S or Se; and

- wherein n is an integer ranging in value from 1 to approximately 10,000.

2. The thermally stable, non-woven, fibrous paper according to claim 1, wherein R_{1-6} are the same or different and comprise H, a hydroxyl group, a straight or branched alkyl, cycloalkyl, polycycloalkyl, heterocycloalkyl, alkaryl, alkoxy, aryl, aralkyl, alkenyl, or alkynyl group containing approximately 1 to approximately 50 carbon atom(s), carbonyls, esters, carbonates, amides, ketenes, epoxides, a silyl or siloxyl group

containing approximately 1 to approximately 50 silicon atom(s), and combinations thereof; wherein X_{1-2} comprise N; wherein X_{3-4} comprise O; and wherein n is an integer ranging in value from 1 to approximately 10,000.

3. The thermally stable, non-woven, fibrous paper according to claim 2, wherein R_{1-6} comprise H; wherein X_{1-2} comprise N; wherein X_{3-4} comprise O; and wherein n is an integer ranging in value from 1 to approximately 10,000.

4. The thermally stable, non-woven, fibrous paper according to claim 3, wherein R_{1-6} comprise H; wherein X_{1-2} comprise N; wherein X_{3-4} comprise O; and wherein n is an integer ranging in value from 1 to approximately 5,000.

5. The thermally stable, non-woven, fibrous paper according to claim 4, wherein the paper is thermally stable to at least 200 degrees centigrade.

6. The thermally stable, non-woven, fibrous paper according to claim 5, wherein the paper is thermally stable to at least 500 degrees centigrade.

7. The thermally stable, non-woven, fibrous paper according to claim 6, wherein the paper is thermally stable to at least 650 degrees centigrade.

8. The thermally stable, non-woven, fibrous paper according to claim 1, wherein the paper is thermally stable to at least 200 degrees centigrade.

9. The thermally stable, non-woven, fibrous paper according to claim 8, wherein the paper is thermally stable to at least 500 degrees centigrade.

10. The thermally stable, non-woven, fibrous paper according to claim 9, wherein the paper is thermally stable to at least 650 degrees centigrade.

11. The thermally stable, non-woven, fibrous paper according to claim 1, wherein the paper further comprises a binder.

12. The thermally stable, non-woven, fibrous paper according to claim 1, wherein the paper further comprises water.

13. The thermally stable, non-woven, fibrous paper according to claim 12, wherein the concentration of the water is less than 5 weight percent.

14. The thermally stable, non-woven, fibrous paper according to claim 1, wherein the concentration of the at least one polymer represented by structural formula I ranges from approximately 50 to approximately 100 weight percent.

15. The thermally stable, non-woven, fibrous paper according to claim 1, wherein the paper further comprises a pH modifier.

16. The thermally stable, non-woven, fibrous paper according to claim 1, wherein the paper is incorporated into a honeycomb core.

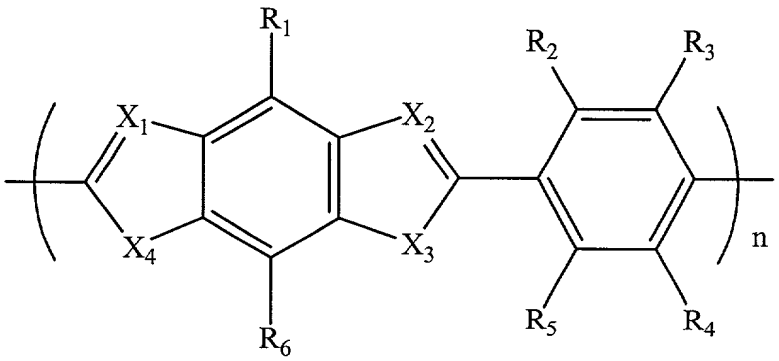
17. The thermally stable, non-woven, fibrous paper according to claim 1, wherein the paper is doped with a transition metal.

18. A thermally stable, non-woven, fibrous paper, comprising:

- at least one binder;

- water; and

- at least one polymer represented by structural formula I:



(I)

- wherein R_{1-6} are the same or different and comprise H, a hydroxyl group, a straight or branched alkyl, cycloalkyl, polycycloalkyl, heterocycloalkyl, alkaryl, alkoxy, aryl, aralkyl, alkenyl, or alkynyl group containing approximately 1 to approximately 50 carbon atom(s), carbonyls, esters, carbonates, amides, ketenes, epoxides, a silyl or siloxyl group containing approximately 1 to approximately 50 silicon atom(s), and combinations thereof;

- wherein X_{1-4} are the same or different and comprise N, O, S, or Se; and

- wherein n is an integer ranging in value from 1 to approximately 10,000.